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ABSTRACT

A study examined the impact of school professional community on the intellectual quality of student achievement (authentic achievement) and the relationship of professional community to the technical and social organization of the classroom, including the mediating relationship of these classroom organizational features on authentic achievement. Professional community is a school organizational structure with an intellectually directed culture typified by shared values, focus on student learning, collaboration, deprivatized practice, and reflective dialogue. Data were collected as part of the School Restructuring Study of the Center on Organization and Restructuring of Schools. Eight elementary, eight middle, and eight high schools were selected. Surveys were completed by 910 teachers, and the instructional practices of 144 teachers were studied according to a view of authentic pedagogy. School professional community was found to be most characteristic of elementary schools and least characteristic of high schools. Findings strongly support the conceptual model posited, that the organization of teachers' work in ways that promote professional community has significant effects on the organization of classrooms for learning and the academic performance of students. Professional community among teachers was associated with both authentic pedagogy and social support for achievement among students. Appendixes discuss the construction of study variables and correlations among variables. (Contains 2 figures, 3 tables, and 75 references.) (SLD)

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Does Professional Community Affect the Classroom?

Teachers' Work and Student Experiences in Restructuring Schools

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Does Professional Community Affect the Classroom? Teachers' Work and Student Experiences in Restructuring Schools

INTRODUCTION

Attention to the development of stimulating workplace environments for teachers has expanded rapidly in the past decade among both researchers and practitioners. Unions and advocates for improved teacher preparation, such as the Holmes Group, have argued that teachers should be regarded as professionals. Accordingly, teachers need to keep abreast of the latest knowledge about their field (Bascia, 1996), and be given the discretionary authority to exercise this knowledge. The teacher-professionalism perspective is not limited to North America, but strikes a powerful chord in other countries as well (McCulloch, 1995; Commissie Toekomst Leraarschap, 1993). Professional development for teachers is an integral component of the bi-partisan *Goals 2000: Educate America Act*.

Beginning with the work of Little (1982), Darling-Hammond (1984), Rosenholz (1989), and Bryk and Driscoll (1988), researchers studying the organization of effective schools have regarded the development of professionally enriching workgroups as a major facilitator of commitment and effort with the potential to improve student learning. Augmenting these early investigations of teachers' work life within schools, recent studies have emphasized the multiple, embedded ways in which teachers seek and use professional networks to increase their knowledge and skills (McLaughlin, 1996; Talbert and McLaughlin, 1993).

Professionalizing the work environment of teachers has become a centerpiece of many proposals for restructuring the "common school" (Lieberman,1992). Little (1993), for example, explores in detail the variety of ways in which policies and practices support (or prevent) teachers in comprehensive high schools from seeking and using professional networks to support their classroom practice and intellectual development; Siskin (1994) suggests that subject matter departments are a locus for revitalization; while

Louis & Kruse (1995) and Newmann & Wehlege (1995) articulate a model of school-wide professional community that focuses teachers' attention on student learning.

Whether such efforts to develop schools as sites for professional networks and/or communities will succeed in affecting school performance is uncertain. Little (1995a,b) suggests the difficulties of achieving closer cooperation even within schools enmeshed in reform. Recent sociometric studies of Dutch primary schools, where engagement with the demands for school-level curriculum development and reform is longstanding, also indicate that many teachers remain isolated or situated within isolated groups in schools that are very small by U.S. standards (Bakkenes, de Brabander & Imants, 1993).[1] Norms of autonomy and isolation tend to persist and can easily interfere with reform efforts intended to focus a whole staff's attention on specific student learning outcomes.

Research linking teacher networks or professional communities to student experiences is sparse. Nonetheless, it is reasonable to expect that teachers who extend themselves professionally and work in concert with others to improve their practice will become "better teachers" -- in the sense of being more effective with pupils (Louis & Kruse, 1995). Based on this hypothesis, we investigate whether the development of school-wide professional community among teachers positively affects classroom organization and, subsequently, the performance of students on authentic assessments. Authentic assessment tasks require students to produce work reflecting higher order thinking, conceptual understanding, and elaborated communication (Newmann, Secada & Wehlage, 1995).

Our analyses draw on survey data from 609 teachers and 5,943 students in 24 nationally selected, restructuring elementary, middle, and high schools (8 at each grade level); classroom observational data collected on students and teachers in 144 mathematics and social studies classrooms at 4 time points; 235 assessment tasks collected at two time points from these same teachers; 5,100 samples of student work in response to these assessment tasks; and in-depth case studies of each of the 24 schools.

We focus primarily on professionally supportive relationships among teachers *within* their schools,

rather than on external networks. The analysis builds on a previous study (Louis, Marks and Kruse, in press) in which the development of strong *professional communities* within schools was associated with an increased sense of *collective of responsibility for student learning*, a school attribute shown to be related to gains in student achievement on standardized tests in comprehensive high schools (Lee and Smith, 1996) . Extending the previous research in two ways, this study examines: (1) the impact of school professional community on the intellectual quality of student performance (authentic achievement); and (2) the relationship of professional community to the technical and social organization of the classroom, including the mediating relationship of these classroom organizational features on authentic achievement.

CONCEPTUAL MODEL

Figure 1 displays the model guiding the analysis. Read from left to right across the top set of constructs, the model depicts (1) the relationship between school organization (operationalized as professional community) and the social and technical organization of the classroom (operationalized respectively as support for achievement and authentic pedagogy); and (2) their mutual relationship to student learning (operationalized as authentic achievement). Displayed beneath these constructs, also from left to right, are the controls we incorporate in the analysis -- grade level (for schools); subject area (for classrooms); and social and academic background (for students).

We discuss the model in the section that follows. Beginning with the dependent variable on the right -- authentic student achievement, we move toward the left of the model -- focusing first on the dimensions of classroom organization; second, on school organization.

Insert Figure 1 about here

Authentic Student Achievement

Research on the relationship between the organization of schools and/or classrooms and student achievement has typically relied on standardized tests, often state or district mandated.[2] Because they fail to assess students' ability to think critically and to solve challenging real-world problems, standardized tests have limited ability to measure what students actually know and can do (Gardner, 1993; Wiggins, 1993; Berlak, Newmann, Adams, Archbald, Burgess, Raven and Romberg, 1992).

To assess authentic student achievement, researchers at the Center on Organization and Restructuring of Schools (CORS) at the University of Wisconsin developed a set of standards for intellectual quality that could be applied across grade levels and disciplines in both practice and research settings (Newmann, Secada & Wehlage, 1995; Newmann & Wehlage, 1995). The underlying conceptual framework for these measures argues that the standards for judging the intellectual quality of student achievement should correspond to the hallmarks of authentic human achievement in any arena. Such hallmarks include the construction of knowledge, disciplined inquiry, and value beyond documenting one's competence in performing the task (Newmann et al.).

To measure up to the standards for authentic performance, students must demonstrate an ability to *analyze and interpret knowledge*, and to *engage disciplinary concepts* (e.g., from social studies, mathematics, science) *in depth*, using *elaborated written communication*.[3] Dimensions of intellectual quality, rather than content, are the focus of these standards. The concept of authenticity can be equally well applied to a content-oriented curriculum or to one that is highly contructivist. Because the concept assumes no particular instructional style, a teacher-centered classroom might score as well on these standards as a student-centered classroom. CORS research has indicated that these standards can be applied reliably to student work at elementary, middle and high school levels.[4]

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Classroom Organization and its Impacts on Student Achievement

The analytic model assumes the centrality of the classroom experience for student learning. If the organization of classrooms is not conducive to intellectually rigorous work, students are unlikely to learn much. A continuous stream of research in the "effective schools" tradition published over the last decade in several countries supports this contention (Creemers, 1994). We focus on two dimensions of classroom organization, the technical (authentic pedagogy) and the social (support for learning). Reflecting findings of previous research, the model suggests a relationship between these dimensions (Oakes, 1985; Newmann, 1989; Slavin, 1990). Authentic pedagogy and social support operate in tandem, according to the model. When classroom organization demonstrates these characteristics, authentic learning is more likely to occur.

Authentic Pedagogy as Improved Core Technology. The *"technical" view of effective organizational functioning* is well-grounded in sociological research both in schools and in other organizational settings.[5] All work has a technical core, which -- in non-routine settings like classrooms -- is based on the accumulated wisdom of craft, research and individual reflection (Perrow, 1967). The technical view (which is also the foundation of much research on classroom practice) assumes that the "core work technology" must be organized effectively for workers to accomplish their production goals -- in our model, authentic achievement.

Teaching and learning constitute the core work technology of classrooms. Factors that affect the core technology -- such as "time on task" and "opportunity to learn" -- are often considered technical approaches to improving student achievement. Authentic pedagogy, however, because it encompasses teachers' instructional and assessment practices, is more than a technical approach: Pedagogy is *constitutive* of the core technology of the classroom. In describing pedagogy as "authentic," we wish to differentiate it from instructional and assessment practices that fail to demonstrate and call forth high levels

of intellectual quality.

Because authentic pedagogy has been described extensively elsewhere (Newmann, Secada & Wehlage, 1995; Newmann, Marks & Gamoran, in press; Newmann & Associates, in press), we summarize its fundamental features. Authentic pedagogy, we note, does not capture every feature of excellence or intellectual quality in teaching. Rather, authentic pedagogy -- as embodied in instruction and assessment -- reflects the hallmarks of authentic human achievement referred to above -- *construction of meaning*, *disciplined inquiry*, and *value beyond the classroom* (Newmann et al., 1995).

Authentic instruction aims at *construction of meaning* by emphasizing higher order thinking; *disciplined inquiry* by emphasizing depth of knowledge and substantive conversation among teacher and students (or students themselves); and *value beyond the classroom* by emphasizing connections to the outside world. Authentic assessment aims at *construction of meaning* by asking students to organize information and consider alternative solutions; *disciplined inquiry* by incorporating the content and process of a discipline, as well as a form of elaborated communication; *value beyond the classroom* by connecting the problem to the outside world and addressing a solution to an audience beyond the school. Just as teachers can use multiple techniques and teaching styles to achieve the instructional aims of authentic pedagogy, they can take multiple approaches to assessing student performance authentically.

Social Support for Achievement. The core technology of the classroom -- authentic pedagogy -- is not the only component of a successful classroom. Because the classroom is a social system, its efficacy and improvement depend on mobilizing the efforts of its members toward group ends.[6] Theories about effective workgroup organization incorporate *affective elements*, dealing with the importance of the social structure of the work setting and the quality of relationships among work group members. Cohesion and support in the core work group are essential not only for the satisfaction of members, but also for their productivity.[7]

Social relationships in schools and classrooms profoundly affect students' ability to learn (Cohen,

1986, 1992; Marks, 1995; Natriello, 1994). Where teacher strategies make it difficult for students to "label" some children as smarter or less smart than others, students engage in more cooperative, helping relationships. The structuring of student peer relations creates incentives and disincentives for learning (Bennett and LeCompte, 1990; Ogbu, 1987). For both older and younger children, the salience of friends as mediators of effort and expectation begins very early.

We focus on one aspect of the affective environment of schools and classrooms -- social support directed toward authentic achievement (Marks, Doane & Secada, in press). Other forms of support may assist students in coping with social or developmental stress, but their impact on learning could be negligible, even negative. Minority group students -- for example, when they harbor bleak prospects for success in school or feel that school will not increase their own life chances -- have developed norms that are in opposition to achievement (Ogbu, 1987). In a classroom where the intellectual focus is meager, students could work together simply to complete worksheets and other low-level assignments.

Social support for authentic achievement, as we operationalize it, is distinguished by three principal characteristics -- the learning environment is orderly and the discipline is fair; teachers set high expectations for student achievement; and students can count on the help of their teacher and peers in achieving ambitious learning goals (Marks et al., 1995).

School-Wide Professional Community

Professional community is a school organizational structure with an intellectually directed culture. Five elements of practice typify professional community -- shared values, focus on student learning, collaboration, deprivatized practice, and reflective dialogue (Kruse, Louis, & Bryk, 1995). These elements are not a hierarchy, but their presence distinguishes professional community that is school-wide from other forms of school cultures. (See Kruse et al. for a comprehensive description.)

Fundamental to any community are *shared values* and expectations. Among a school

professional community, teachers affirm, through language and action, common beliefs and values underlying assumptions about children, learning, teaching and teacher's roles; the nature of human needs, human activity, and human relationships; and the organization's extended societal role and its relationship with the surrounding environment (Giroux, 1988; Schein, 1985; Newmann, 1991).

A *collective focus on student learning* is central to school professional community, leading its members to construct their work to benefit students' opportunity to learn (Abbott, 1991; Darling-Hammond & Goodwin, 1993; Darling-Hammond & Snyder, 1992; Little, 1990) and to provide instruction that promotes students' intellectual growth and development. To hone their skills for instructing effectively, teachers share expertise through collaboration, a process that increases teachers' sense of affiliation with each other and with the school (Louis, 1992).

Where professional community exists, teachers share and trade off the roles of mentor, advisor, or specialist (Lieberman, Saxl, & Miles, 1988; Little 1990). Peer coaching, teamed teaching, and structured classroom observations entail *deprivatized practice* to improve pedagogy and collegial relationships. By engaging in *reflective dialogue* about teaching and learning, teachers can examine the assumptions basic to quality practice (Newmann, 1991). Reflection upon practice leads to deepened understandings of the process of instruction and the products of teaching and learning.

Other Model Variables: The Importance of Statistical Controls

Students' social and academic backgrounds affect the rate and level of their learning -- even in ideal school settings. Because student background can influence achievement independently of school or classroom features, it is important to take it into account when evaluating organizational effects on achievement. Thus, we control for students' prior achievement, gender, race-ethnicity and socio-economic status. Although the innovations undertaken by restructuring schools may mitigate the disadvantaging effects of some of these background characteristics, they do not eliminate them entirely

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(Lee & Smith, 1995).

Similarly, at the classroom level where we examine the relationship of technical and social support to achievement, we control for subject matter. Subject matter conditions the professional practice of teachers, including their views of knowledge, their instructional approaches, and their goals for students (Stodolsky & Grossman, 1992). Given documented differences between mathematics and social studies classrooms (Stodolsky, 1988), including differences in how students perceive each subject Stodolsky, Salk & Glaessner, 1991) we control for classroom subject matter. Because school professional community, the school organizational measure of particular interest here, is most characteristic of the elementary schools in the sample (Louis et al., in press), we control for elementary school. Because school size has proven to be an influential factor on students' school performance (Lee & Smith, 1996), we take size into account in the model.

Research Questions

Our analysis flows from the conceptual model we have developed, positing the interrelationships between school professional community, classroom technical and social organization, and authentic student achievement. Aspects of classroom technical and social organization -- specifically, authentic pedagogy and social support for achievement, are intermediate outcomes, which we hypothesize to influence authentic achievement positively. The organization of the teaching staff as a professional community will positively affect, according to our hypothesis, both classroom organization and student achievement.

To evaluate the relationships the conceptual model frames, we investigate two research questions:

1. To what extent does professional community influence the social and technical organization of the classroom?

2. What is the relative effect of school professional community and classroom social and technical organization on student achievement?

METHOD

Sample and Data

Data for this study were collected between 1991-1994 as part of the School Restructuring Study (SRS) of the Center on Organization and Restructuring of Schools (CORS). Eight elementary, eight middle, and eight high schools were selected through a national search for public schools that had made substantial progress in organizational restructuring in the areas of student experiences; the professional life of teachers; school governance, management, and leadership; and the coordination of community resources. The strategies used to identify and sample schools, and the degree to which they exhibited specific features of current school reform proposals, have been extensively discussed elsewhere (Berends & King, 1994; Newmann, 1991).[8]

All teachers were asked to complete a questionnaire on their instructional practices, professional activities, personal and professional background, as well as their perceptions of the school culture and the effects of school restructuring.[9] The subject response rate, with 910 teachers completing surveys, ranged from 69 percent to 100 percent across schools. The item response rate for completed teacher surveys averaged 95 percent. All students in the observed classes, along with other classmates in the same grade, were asked to complete a survey asking about their experiences in the class and the school. The overall response rate for students was 82%.

Teams of three CORS researchers visited the participating schools in the fall and spring of the year for the purpose of observing instruction; conducting interviews with between 25 and 35 teachers, administrators and other school stakeholders; and experiencing the "life" of school, including such regular activities as meetings of the faculty, governance councils, and other groups.

The instructional practice of 144 core class teachers (three mathematics and three social studies teachers from each of the 24 schools) received extensive scrutiny according to the view of authentic pedagogy discussed above. Approximately a quarter of the observed classes were rated by two CORS

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researchers, and their rate of agreement for the four dimensions of authenticity is estimated as a correlation of .78 In addition, all 144 core teachers were asked to provide two written assessment tasks that they assigned students in the fall and the spring: these tasks were selected by the teacher, following our request, as typical of how they assessed student learning. Subject matter specialists from the CORS staff in collaboration with teacher practitioners from the Madison, Wisconsin area rated the authenticity of the tasks. A two-person team of raters scored the assessment tasks independently. If these raters did not agree, they discussed their differences and arrived at a mutually acceptable consensus score.

The teachers also submitted student work completed in response to the assessment tasks. The collected materials -- over 5,000 student papers -- were rated by trained researchers and practitioners using the criteria for authentic student achievement. More than one-third of the student materials were rated by two individuals. The estimated correlation between these raters' scores is .77 for social studies, .70 for mathematics.[10] (For more information about the instruments and procedures for observing teachers, collecting and rating assessment tasks and student work, see Newmann et al.1995; Newmann et al., in press; Newmann & Associates, in press).

Each core class teacher was also interviewed twice during the year about his or her work life. In addition, other representative teachers were interviewed twice, and teachers nominated by their peers as influential in the school, or exceptional teachers, were interviewed and observed at least once. CORS researchers attended governance and professional meetings that occurred during the site visits, and collected and analyzed any written materials relating to the school's restructuring efforts. The interview, observation and documentary material were summarized in school case studies, which followed a common topic outline. These documents (150-200 single spaced pages) were prepared by the site visit team, extensively critiqued by other staff members, revised, and finally coded in order to facilitate easy retrieval of cases that illuminate analytic issues. We use the case studies to develop our model and to assist in interpreting the results of the quantitative analyses; more data from the case study component of the study

is available in Louis, Kruse and Marks (in press).

Measures

Authentic academic achievement. The achievement measure sums student scores in mathematics and social studies on three dimensions of performance -- analysis, disciplinary concepts, and elaborated written communication. The description of each dimension varies somewhat according to subject area, that is, whether the standard is being applied to mathematics or social studies (See Appendix A). *Analysis* refers to students' ability to demonstrate and explain their thinking by such means as organizing, synthesizing, interpreting, hypothesizing, evaluating. *Disciplinary concepts* refers to students' demonstrating understanding and ability to work with and manipulate the ideas, concepts, and theories of the discipline. *Elaborated written communication* refers to work which is clear, coherent, well-articulated, and richly argued. Student work was scored on each standard, using a scale of 1-4. The overall performance score is the sum of the scores on the three rubrics. The possible range of the performance scale is 3-12. The measure is standardized for some of the analyses ($M=0$, $SD=1$).

Authentic pedagogy. Authentic pedagogy is a composite measure combining teachers' scores on observed classroom instruction and assessment tasks. The standards for instruction and assessment tasks exemplify the more general set of standards for human achievement -- construction of knowledge, disciplined inquiry, and value beyond documenting one's competence -- described earlier during our discussion of the conceptual model. (Appendix A contains a more detailed description of the standards, as well as all the variables used in these analyses. See also Newmann et al., 1995).

The standards applied to classroom instruction are four -- higher order thinking, substantive conversation, depth of knowledge, and connections to the world beyond the classroom. *Higher order thinking* involves students in manipulating information and ideas, rather than merely reproducing them. *Substantive conversation* entails sustained interchanges among students and teacher and/or among students

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themselves in ways that build improved understanding of concepts and ideas. *Deep knowledge* calls for students to focus on ideas or concepts central to the discipline with sufficient thoroughness to produce an understanding of complex relationships. *Connections to the world beyond the classroom* represents the linkage between knowledge and students' own lives or public issues. The instruction standards are on a scale of 1-5.

The scoring of assessment tasks comprised seven standards -- organization of information, consideration of alternatives, disciplinary content, disciplinary process, elaborated written communication, problem connected to the real world, and audience beyond the school. *Organization of information* asks students to organize, synthesize, interpret, explain, or evaluate complex information. *Consideration of alternatives* asks students to consider alternative solutions, strategies, perspectives, or points of view. *Disciplinary content* asks students to show an understanding of disciplinary ideas, theories, or perspectives. *Disciplinary process* asks students to use the methodological approach of the discipline. *Elaborated written communication* asks students to express their understanding, explanations, or conclusions through extended writing. *Problem connected to the real world* asks students to address an issue, problem, or concept external to the classroom or school. *Audience beyond the school* asks students to communicate with an audience beyond their teacher and class- or schoolmates. The standards for assessment tasks are on a 1-3 or 1-4 scale.

The score for authentic pedagogy is the sum of a teacher's instruction score on each standard (averaged over four observations) and assessment task score (averaged over two tasks). The internal consistency (Cronbach's alpha, α) of the 11-item scale is .79. The range of possible authentic pedagogy scores is 11-43. The measure is standardized for some of the analyses ($M=0$, $SD=1$).

Social support for achievement. Construction of this measure entailed the use of classroom observational data and student responses to survey items pertaining to their school as a learning environment generally conducive to learning and to their mathematics and social studies classrooms.[11] The

observational measure of support is on a 1-5 scale, ranging from negative social support to positive social support. Indicators of negative support include comments, actions, or behaviors on the part of a teacher or peers in the classroom that would discourage effort, participation, and taking risks to learn -- or a generally negative classroom atmosphere. Indicators of positive social support include the teacher conveying high expectations for all students -- such as encouraging all to try hard to master challenging work and to take the risks required to learn. The measure, scores averaged over 4 observations, is standardized (M=0, SD=1).

Students characterized their school environment for learning by responding to six survey items on a 1-4 scale, strongly disagree to strongly agree. The items included: (1) Discipline is fair; (2) Students make friends with students of other racial and social groups; (3) In school I often feel put down by other students (rev.); (4) Most of my teachers really listen to what I have to say; (5) Disruptions by other students get in the way of my learning (rev.); (6) My friends and I are treated fairly at this school. The measure is constructed as a factor and standardized (M=0; SD=1).

Students also rated the learning environment of their mathematics and social studies classrooms by responding to eight items on a 1-4 scale, strongly disagree to strongly agree. The items include: (1) If I have trouble with my work, my teacher gives me help; (2) If I have trouble with my work, my friends give me help; (3) The teacher believes I can succeed; (4) Many students don't respect one another (rev.); (5) Many students try to help one another learn; (6) My friends and I help each other with our homework; (7) The teacher expects me to do my best all the time; (8) The teacher gives me extra help when I don't understand something in class. The measure is constructed as a factor and standardized (M=0; SD=1).

The composite measure of social support for achievement is the sum of the three standardized measures -- observed social support in the classroom, students' reports of the school environment for learning, and students' reports of the classroom learning environment (Cronbach's α =.79). The composite measure is also standardized (M=0, SD=1).

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Teachers' professional community. Professional community is school-based, according to our model, rather than a representation of teachers' experience in other collegial groups, including subgroups within the school (such as departments or grade levels) and professional networks or organizations beyond the school. We operationalize professional community as a characteristic of both teachers and schools through an index that represents the sum of five components (Cronbach's $\alpha = .69$), each standardized ($M = 0$, $SD = 1$). The index is standardized ($M = 0$, $SD = 1$).

Constituting the professional community index are the following measures: shared sense of purpose, a collective focus on student learning, collaborative activity, deprivatized practice, and reflective dialogue. Each of these measures is a single factor formed through principal components analysis. For the school measure of professional community, each factor was aggregated to the school level.

Shared sense of purpose conveys the notion that a consensus exists among the school staff regarding the school mission and the principles underlying the day-to-day operation. *Collaborative activity* combines a general assessment of the extent of teachers' cooperative practices and their perceived usefulness with a more specific temporal measure of collaboration. A *collective focus on student learning* suggests the emphasis teachers place on teaching for higher order thinking and authentic student learning. *Deprivatized practice* measures the frequency with which teachers observe each other's classes to critique their colleagues' teaching and to provide meaningful feedback, and, as well, the frequency of constructive review from supervisors. *Reflective Dialogue* gauges the amount of professional conversation directed at specific issues surrounding instructional practice.

Analytic Approach

Because schools vary considerably in their organization by grade level (elementary, middle, or high school), we introduce the analyses with a comparison of observed grade level differences. Employing oneway analysis of variance (ANOVA) for this comparison, we consider the complete set of

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study variables -- that is, those measured on schools (professional community and school size), classrooms (social support for achievement, authentic pedagogy, and subject area of the core class), and students (authentic performance, gender, race-ethnicity, socioeconomic status, and prior [NAEP] achievement).

To address the first research question, evaluating the relationship of school professional community to the technical and social organization of the classroom -- authentic pedagogy and social support for achievement -- we use a multilevel analytic technique, HLM (Bryk & Raudenbush, 1992; Bryk, Raudenbush & Congdon, 1994). Because the analysis involves nested data -- classrooms within schools, we employ HLM and use the two-level program. To determine the amount of variation in authentic pedagogy and social support for achievement among the 24 restructuring schools in the sample -- potentially explainable by school professional community, we perform an initial analysis, using an unconditional HLM model.

To learn how much of the variation in the school average level of authentic pedagogy and social support for achievement can be explained as a function of school professional community, we use a means-as-outcome HLM model. We take into account classroom compositional features that could influence these dimensions of classroom organization, incorporating statistical adjustments for the proportion of students who are female, African-American, Hispanic, the average socioeconomic status of the students, and the students' NAEP achievement.

To evaluate the influence of school professional community and classroom technical and social, organization on student achievement, our second research question, we take into account the increased nesting of our data -- students nested within classrooms which are also nested in schools. Accordingly, we use the HLM three-level program. As in the previous analysis, we first estimate the amount of variance in achievement occurring between schools. Because we are also interested in examining the relative importance of classroom organization on authentic achievement, we then estimate the amount of variation in authentic achievement explainable by the differences among classrooms within schools and by

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differences in the social and academic backgrounds of the students within those classrooms.

Addressing the school and classroom organizational dimensions of our second research question sequentially, we conduct this set of analyses by evaluating our model in three stages, focusing in the following order on: (1) the social organization of the school -- school professional community; (2) classroom social organization -- social support for achievement; and (3) the technical organization of the classroom -- authentic pedagogy.

Taking the social and academic background of students into account but including no predictors at the classroom level, we estimate the effect of school professional community on student achievement (stage one). Retaining school and student background characteristics, we expand the model to examine the contribution of classroom social organization to authentic achievement (stage two). In the fully developed model, we incorporate authentic pedagogy -- the measure of classroom technical organization (stage three). Based on the implications of subject matter for classroom organization, in the second and third analyses we adjust for whether the class is in mathematics or social studies (using a dummy variable, coded mathematics = 1, social studies = 0).

Using a set of scatterplot analyses, to conclude the quantitative investigation, we illustrate the relationships among the organizational variables for the SRS schools. Based on these analyses, we select schools to exemplify the findings. The data from the school case studies provides the documentation for the qualitative analyses.

RESULTS

Observed Differences

Comparing the SRS schools by grade level on the set of organizational properties discussed above, we found school professional community to be most characteristic of elementary schools and -- separated by more than a standard deviation -- least characteristic of high schools ($P \leq .07$) (Table 1). Classroom

social organization varies by grade level, with social support for achievement strongest in elementary schools and, again a standard deviation apart -- weakest in high schools ($P \leq .001$). Classroom technical organization, as measured by authentic pedagogy, is constant across grade levels. While the ratio of mathematics to social studies classes is relatively even, the slight differences are attributable to the patterns of missing data for student work. (Only classrooms with authentic achievement data for a representative number of students are included in the analyses.)

Insert Table 1 about here

Among the students within SRS classrooms, the ratio of girls to boys is even. More African-American students (32%) are represented in SRS high school classrooms than at the lower grade levels ($P \leq .001$); and, conversely, more Hispanic students (37%) occupy the elementary school classrooms ($P \leq .001$). Student performance on the SRS authentic measures is lowest in elementary schools, highest in middle schools ($P \leq .001$). Conversely, NAEP achievement scores are highest in SRS elementary classrooms, lowest in middle schools ($P \leq .001$).

School Professional Community and Classroom Organization

To what extent does professional community contribute to the social and technical organization of classrooms? Adjusting for school grade level (because of the substantial variation in professional community and achievement occurring among schools according to level) and classroom social and academic composition, we found that to the extent that school professional community is present, social support for achievement will be higher in the classroom (.31, $P \leq .01$) (Table 2). The model accounts for

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over 90% of the variance in support for achievement occurring among schools. Similarly, where schools achieve professional community, the quality of classroom pedagogy is considerably higher (.36, $P \leq .01$). The model accounts for 36% of the variation among schools in authentic pedagogy.

Insert Table 2 about here

Among the control variables included in this analysis, elementary level strongly influences the level of social support for learning found in schools (.57, $P \leq .01$), but its negative relationship to authentic pedagogy is not significant. The variation among schools in social support for learning is not attributable to measured classroom compositional characteristics, but the school level of authentic pedagogy is significantly higher when the classroom level of NAEP achievement is higher.

Pathways to Student Achievement: A Comparison of Models

To what extent is the variation in student achievement that occurs among schools a function of their organization as professional communities? Adjusting for grade level and student background -- with no classroom-level predictors (Model 1), we found that the achievement level is significantly higher to the extent that schools are strong professional communities (.26, $P \leq .001$) (Table 3). The model accounts for 85% of the variation in authentic achievement. Since the pattern of effects for the control variables is similar across the three models, we will reserve discussion of these relationships to our presentation of Model 3.

Insert Table 3 about here

Examining school professional community and classroom social organization simultaneously (Model 2) -- adjusting for grade level, classroom subject area, and student background -- we note that classroom social support for authentic achievement further lifts school authentic achievement levels (.19, P ≤ .01) in addition to the boost school provided by professional community (.20, P ≤ .01). Adding classroom social organization to the model results in some diminishment of the school organizational effect exerted by professional community. The result suggests, therefore, that the effect of professional community on school levels of authentic achievement is partially explained by classroom social organization of those schools. Social support for authentic achievement tends to correspond to school professional community as our earlier analysis (Table 2) suggested.

Investigating the impact of classroom technical organization on school average level of authentic achievement -- while simultaneously examining school and classroom social organizational influences, we find a striking result. Authentic pedagogy subsumes the social organizational effects (school and classroom) previously found to contribute to authentic student performance (.36, P ≤ .001). Drawing on our earlier finding that school professional community strongly predicts the school's level of teaching quality as measured by authentic pedagogy (Table 2), we suggest professional community boosts achievement because it engenders authentic pedagogy.

Authentic pedagogy also eliminates the effect of classroom social organization on achievement. Authentic pedagogy and social support for achievement, as the conceptual model set forth, are correlated in classrooms (.50, P ≤ .05). The final model explains virtually all of the variation in authentic achievement occurring among schools and 65% of the variation occurring among the classrooms in these schools.

Although we return to these findings in the discussion section, we wish to make two points here. First, authentic pedagogy and authentic student achievement, as Center researchers have pointed out

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elsewhere (Newmann et al., in press), are closely linked; that is, the measure of achievement responded to an assessment task prepared by a teacher whose score on the quality of that task is a component of the authentic pedagogy construct. Second, as results of the analyses suggest, the major constructs in these analyses are strongly interrelated (Appendix B), thus supporting our conceptual model. While the technical organization of the classroom, as measured by authentic pedagogy dominates the analysis, another CORS study explicates the interrelationship between professional community, authentic pedagogy and social support for authentic achievement (Marks et al., 1996a,b). Put very briefly, that study demonstrates how professional community creates a school culture where support for authentic learning is strong and authentic pedagogy is the means for bringing it about. Moreover, the challenging intellectual work that, by definition, constitutes authentic pedagogy tends to engender social support in the classroom.

To conclude the presentation of the quantitative analyses, we discuss briefly the relationship of the control variables to authentic achievement (Model 3). Authentic achievement in the SRS elementary schools proves significantly lower than in the secondary (middle and high) schools (-.60, $P \leq .001$). Girls and students with higher prior achievement (NAEP) scores tend to rank higher on the authentic achievement measure; the positive effect of social class is very small. African-American students score significantly lower than their classmates on the authentic achievement measure. (For a discussion of the relationship of social background to authentic achievement, including a comparison of student scores on authentic and standardized achievement measures, see Newmann, Marks and Gamoran, in press.)

Scatterplot analyses provide a vivid way of depicting relationships between two variables -- such as between school professional community and authentic pedagogy and between school professional community and social support for achievement. Figure 2 illustrates the first of these relationships; Figure 3, the second. Our qualitative analysis focuses on two of these schools -- Cibola High School (School V in the scatterplot) and Lamar Elementary (School H).

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Insert Figures 2 and 3 about here

Professional Community and the Classroom: Qualitative Results

The case study data regarding professional community help to illuminate the processes by which some of the above findings occur. Here we offer some examples of how professional community enhances classroom practice in two schools that scored very highly on both professional community and authentic student achievement: Lamar, an elementary school on the west coast, and Cibola, a small high school on the east coast. Both are located in large, metropolitan districts, and both are well-established schools of choice (i.e., in operation for six years or more at the time of our site visit). We hasten to add, however, that the choice characteristic, while indicative of school autonomy that fosters professional community (Louis & Kruse, 1995; Newmann and Wehlege, 1995), is not the main cause of their high levels of professional community: Other schools that were not district-wide choice schools for all students also scored very highly on both of these variables. We examine two ways in which aspects of the schools' professional community -- shared norms and values, and deprivatized practice-- fostered both strong support for achievement in the classroom and authentic pedagogy.

Shared norms and values. Cibola and Lamar placed less value on the individual teacher's passion for subject matter than did many other of the SRS schools, and more value on the common commitment to a particular set of educational goals for students. Such school values were core operating principles at Cibola and Lamar, but they permitted a great deal of flexibility for individual and team choices about specific elements of the curriculum.

Cibola's shared values were reflected in two educational goals demonstrated by faculty and administration: (1) to help all students learn to use their minds well; and (2) to prepare all students for

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college. The commitment to fostering students' "habits of mind" is connected, quite explicitly, to authentic pedagogy. To foster the core educational goals, Cibola sought to maintain a democratic community of staff and students.

Lamar's strong set of espoused values supported authentic pedagogy. These values included (1) the worth of creating self-motivated, independent learners who could think for themselves and take responsibility for asking the questions and doing the work required to learn; (2) a regard for depth of understanding that fostered insight into relationships rather than learning of facts; and (3) the need for students to make connections between subject matter knowledge and real life issues and questions, especially those related to human relations and the environment.

Despite the very high levels of cohesiveness around values exhibited by Cibola and Lamar, professional community did not result in uniformity of opinion about pedagogy or student needs within the school. In fact, the opportunity to share alternative perspectives within a context of shared values sustains the intellectual culture of professional communities. Such discussions can challenge teachers' deeply held beliefs or can contest teachers' assumptions, while at the same time pushing forward teachers' thinking about intellectual quality. As one teacher from Cibola noted:

> Given the fact that everybody came here and that everybody is a thinking educator, I don't know how you can expect them [to agree on everything] -- and also in an atmosphere to encourage people to come with different cultural backgrounds and different beliefs -- and to encourage and welcome that.

In discussions around pedagogy and student needs, teachers have the opportunity to consider and change their practice. The perspectives of colleagues and new information can influence practice. For genuine dialogue to occur, where differences can be freely aired, requires a context of trust and respect for

each other's professional skills and contributions to the school community:

> I think that in as much as everybody who works here came because they wanted to, because of the nature of the work, everybody who works here is a thoughtful, thinking person about education. There's nobody here that doesn't like kids, who's just putting in their time until they retire, or who doesn't at some level think about teaching and learning...

Deprivatization of practice. Both Cibola and Lamar have organizational supports for deprivatization of practice. Both schools use the same primary vehicle -- a teamed pair of teachers. Other strategies for deprivatization existed among the 24 schools, but teacher teaming, in the context of professional community, continually focused teachers' attention on improving practice and the creating sustained, supportive relationships with students.

At Lamar, all teachers were assigned to a two-person team, which provided the opportunity for teachers to directly observe one another's teaching on a regular basis. Teacher teams regularly plan units and lessons, discussing fine points of curriculum development and student's reactions to previous lessons. Overwhelmingly teachers support this arrangement, "I wouldn't give my partner up for the lottery. We really have it [teaching together] down and really complement and supplement one another. I couldn't ever imagine teaching without a partner again. It's just so nice having another adult in there."

Another teacher underscores her colleague's feelings by adding, "That's what makes it work: the give and take of sharing, and having a stake in this place. This is our school, not just a place that we come and work." The deprivatization afforded by teaming reinforced teachers' sense of responsibility for student inclusion in their classrooms, with each student being followed by one team for at least two of their years in the school. For Lamar teachers, the opportunity to work with other teachers in an open and

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public relationship enhanced both the quality of their work life and their feelings of success with students on both the academic and social level.

Because Cibola is a high school, the commitment to deprivatized practice -- while similar to Lamar's -- functioned somewhat differently. Teams also form the basic unit for collaborative work, with a pair of teachers taking on responsibility for the full curriculum and 40 pupils. Students remain with their team for two years. Team organization at Cibola requires intense collaboration, because teachers expect to remediate the many deficiencies in social skills that students often bring to class with them and to instruct students in the full range of high school subject matter. Team partners need to agree on what knowledge is essential for each unit and to negotiate practices with their colleagues who

share the students. At Cibola, teachers' social relationships with students were more like those of an elementary school than a typical high school. As one teacher said, "If a kid sneezes on the fourth floor, we say gesundheit on the third. They resent it, but they love it.... What kid wouldn't like that kind of attention?" Students clearly recognize the difference, noting that "you are a name and a face, in other words, a person. In some other schools you're just an I.D."

Teaming also results in substantive discussion about pedagogy, at the daily and most intimate level. Although team members typically do not co-teach classes, one teacher reports that:

> When I get frustrated with a kid [and] I don't know what to do...I go to [my teammate]. 'What do you do that works with this kid?' We sit down and brainstorm.... I'd say every other afternoon we talk to each other. We're always in each other's rooms.

While other groups of teachers share experiences and work on curriculum (especially on projects or units

that all students in a two-grade level cohort will experience), it is the close relationship with a highly respected partner that sustains Cibola's commitment to high achievement goals (and college) for what is a largely poor population.

CONCLUSION AND DISCUSSION

Our findings strongly support the conceptual model we posited, contending that the organization of teachers' work in ways that promote professional community will have significant effects on the organization of classrooms for learning and the academic performance of students. Professional community among teachers proved to be associated with both authentic pedagogy and social support for achievement among students. In schools where professional communities functioned, students achieved at high levels. Social support for achievement in the classroom also boosted school authentic achievement levels. Ultimately, however, the beneficial influence of both professional community and support for achievement on school average authentic performance proved to be explained by authentic pedagogy at the technical core of the classrooms within these schools.

Our results are derived from a nonrepresentative sample of 24 schools, most of them located in bureaucratized urban environments, selected for study because they were engaged in an ambitious effort at reform. Compared to their counterparts nationally, the students enrolled in these schools were more likely to be minority and economically disadvantaged. Although the uniqueness of the sample limits the generalizability of our findings, we also suspect that the constrained variation in all of the major variables has attenuated our findings.[12]

Our measures of authentic pedagogy and authentic student achievement are also unique. Although we recommend further research to evaluate our model on a representative sample of schools, we find support for our findings in a CORS study using data from the National Education Longitudinal Study of

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1988 (NELS:88) (Lee & Smith, 1995). Our colleagues found that more organic forms of school management and more authentic pedagogy are associated with increased student learning as measured by conventional tests in a large national sample of 850 high schools (Lee & Smith, 1995).

Beyond the immediate findings, our data have some implications for both theories of school organization and practical issues of school reform. We will address each of these in turn.

Implications for School Organization Theory

Since the beginning of the "effective school" debate, scholars studying classroom organization and their counterparts studying school organization have rarely found common ground in accounting for organizational effects on student achievement. Classroom-oriented researchers, arguing that gains in student achievement occur in classrooms, have attended to such diverse topics as the effects of cooperative learning, creating an inclusive classroom climate, the development of peer groups in the classroom, and the use of action research strategies to improve classroom performance. Extant research in the classroom organizational stream incorporates both the technological and social support frameworks articulated in our model.

School organization scholars, many of them buoyed by the initial effective schools findings, have also continued to focus primarily on a single unit of analysis -- the school. Undaunted by findings that *within*-school variance in student performance exceeds that *between*-schools, these scholars continued to model themselves after organizational sociologists and management theorists who were primarily interested in how to predict what kinds of units would function better. Increasingly refined data sets and better analytic techniques, such as hierarchical linear modeling (HLM), have permitted researchers to examine school and classroom effects on student outcomes simultaneously, while controlling for individual differences. The availability of better research tools has increased the theoretical interest in this line of research.

Our model and analysis suggests the usefulness of theories that better connect school to classroom level organization. Despite the limitations of a relatively small and rarefied sample of schools, the strength of the predictive results between school and classroom organizational variables suggests a need for further analysis and development.

A second implication is the recognition that both the technical and social organization of schools and classrooms foster students' success. This theme was clearly outlined in Bryk, Lee and Smith (1990), but is rarely fully integrated into theories about how schools work in practice. Descriptions of the technology of teaching and the social conditions surrounding instruction are, nonetheless, embedded in most qualitative studies of teaching and classrooms. Public policy discourse has acknowledged that both the technical and social issues of schools and classrooms need critical attention. But few *new* models of schools as organizations -- reflecting a socio-technical integration -- have developed. By noting this lack of development, we do not recommend elaborating existing socio-technical models. Such models, often embedded in old language (and dichotomies, such as "Theory X and Theory Y"), do not reflect newer streams of thinking about schools that emerge from critical theory and postmodernist perspectives. Rather, we suggest that the significant accumulation of research evidence over the past decade about what makes schools work better or less well be reexamined for important theoretical lessons.

Implications for School Reform

The tensions in the arena of school reform are formidable. We point to three of them. Policy makers at state and national levels want "systemic reform" very quickly, which often includes focusing more on the development of standards and accountability systems than on teacher and school development. Others, representing virtually every political persuasion, argue that because the key site for improving education is the school, control over educational practice ought to be decentralized to groups of committed teachers and administrators (Chubb & Moe, 1988; Meier, 1995). A major trend in colleges of education,

in contrast, is to reexamine the role of individual teachers as intellectuals and as critical actors both within and outside the classroom (Giroux, 1990; Cohen, et al, 1994). The focus on action research and intervention to increase the ability of individual teachers to be more reflective as a strategy for changing education is a concomitant approach.

These debates will not be resolved by a study of 24 restructuring schools. However, the data presented here do suggest a great potential for joining the three perspectives: Develop policies to support schools and teachers in building forms of school organization to promote student learning suited to the economic and social uncertainties of the future. All three levels may be important: schools and teachers will need help from outside in learning new forms of pedagogy, and in how to assess the development of classroom qualities that foster learning. The problem goes beyond better training or more solid implementation plans, however. The significance of professional community as a variable influencing classroom organization demands attention to the development of school workplace relationships that promote openness, genuine reflection, and collaboration focused on student learning, as contrasted to the "contrived collaboration" that so frequently emerges when standardized efforts to promote community are imposed on the school from without. Our data suggest that individual teacher performance in classrooms is critical, but that both immediate collegial support and extensive external support may be necessary to get there.

TECHNICAL NOTES

1. Imants (personal communication) indicates that the results of the published study have been confirmed in a larger sample, with greater variability in size and location.

2. See, for example, Hallinger and Murphy, 1986; Rosenholz, 1989, for examples that use state tests. The NELS and HSB data bases are, of course, a rich source for analyzing a national sample of secondary schools. There is no recent national sample that includes elementary and middle schools where student achievement data can be paired with school data collected from teacher and/or administrator surveys. There are a variety of studies in Europe that have national samples of elementary school data (Scheerens, 1992; Mortimer, et al., 1988; Creemers, 1994), but these also typically use traditional "bubble tests" or other standardized exams to assess student achievement.

3. While CORS acknowledged the importance of alternative modes of demonstrating understanding, problems of reliable assessment of art, videos, or other components of a full student portfolio across disciplines are not yet resolved.

4. Teams of currently practicing classroom teachers and "subject matter specialists" from universities achieved an acceptable level of reliability in scoring the quality of student work in mathematics and social studies (Newmann & Associates, in press).

5. For classical examples of a technical approach in the industrial literature, see Woodward, 1965; Thompson, 1968; and Perrow, 1986.

6. The concept of the socio-technical system was developed at the Tavistock Institue in the 1960s. Classic works -- Jaques (1951) and Miller and Rice (1967) -- elaborate the concept.

7. For classic examples of the social quality approach in the industrial literature, see Seashore (1954), Miller and Rice (1967).

8. To solicit nominations, the Center publicized the search for schools in professional educational journals (including the NEA and AFT newsletters), and also contacted by letter and phone researchers and state administrators who would be likely to know of schools that were significantly involved in restructuring. All nominated schools were asked to respond to a written questionnaire in which they indicated whether they had each of 31 restructuring characteristics, ranging from heterogeneous grouping of students, to changes in the use of time during the school day and/or year, to coordination of community services for families. CORS researchers conducted telephone interviews with administrators at the schools that appeared to be involved in broad restructuring made one-day site visits, when schools showed promise, to ascertain the nature and breadth of restructuring activity. The selection of schools maximized variation on approaches to restructuring, to include some "new" schools and some long-established restructuring schools, and focused primarily on schools that were serving students of color and/or less affluent students. Two elementary, one middle, and three high schools were "schools of choice" for most or all students. An effort was also made to represent as many states as possible. A comparison of the 24 schools with the universe of U.S. public schools suggests that they are slightly larger, and, as expected, that they enroll more minority and poor students. CORS staff classified 21 of the schools as urban, 2 as suburban, and 1 as rural. Although the schools are less advantaged that a cross-section of U.S. schools, NAEP scores for the elementary and middle schools in our sample are slightly above the national average. However, NAEP

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scores are normed for 12th grade, while the students in the eight high schools were predominantly 10th graders. For additional comparative information, see Marks (1995) and Appendix B in Newmann and Associates (in press).

9. Additional quantitative data include: a school profile survey, student questionnaires from all students on a designated grade level, ratings of teacher assessment tasks and student performance in six core classes (three social studies, three mathematics), and student baseline NAEP achievement data for the same core classes. A complete description of the study may be found in *Authentic Achievement: Restructuring Schools for Intellectual Quality* (Newmann & Associates, in press).

10. These correlations are based on the scoring of student work during the first year of the study. During year one, two raters scored every piece of student work independently. In subsequent years, for a reliability check, the Center assigned a sample of the student work, representing about 20 percent of the pieces submitted, to two raters.

11. Although our analysis focuses on social support for achievement in the classroom, we include the measure of school environmental support in the construct because several of the items overlap with students' classroom experience and all of the items have implications for it.

12. For example, if we included wealthier, suburban schools, and poor rural schools, we would expect more variance in student achievement; if we had included a larger number of schools that were "stuck" rather than involved with reform, we would have increased the variance in teachers' professional community.

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Table 1
Observed Differences on Study Variables by Grade Level

	Elementary	Middle	High
Schools	(N=8)	(N=8)	(N=8)
Professional Community[a]	.61	-.11	-.50
Classrooms	(N=46)	(N=41)	(N=44)
Support for Achievement[a]	.64***	-.13	-.40
Authentic Pedagogy[a]	.11	-.05	-.06
% Mathematics Classes	47.8	51.2	47.7
Students	(N=1340)	(N=1119)	(N=1131)
% Female	50.6	52.3	51.7
% African American	14.9	10.1	31.7***
% Hispanic	36.8***	11.8	15.7
SRS Achievement[a]	-.17	.18***	.04
Socio-Economic Status[a]	-.01	.16***	-.15
NAEP Achievement[a]	.27**	-.08	-.29

[a] Variable is standardized, M=0, SD=1.0.

** P ≤ .01 *** P ≤ .001

Table 2
The Effect of School Professional Community on Social Support for Achievement and Authentic Pedagogy[a]

	Dependent Variables	
	Social Support for Achievement	Authentic Pedagogy
Intercept[b]	-.37	.08
School Professional Community	.31**	.36**
Elementary School	.57**	-.33
% Female	.00	-.01
% African American	-.02	.08
% Hispanic	-.03	.09
Average SES	.05	.06
Average NAEP Achievement	.13	.25**
Percentage of Between-School Variance Explained	91.4%	36.2%

** P < .01

Table 3
Pathways to Authentic Student Achievement: Professional Community and Classroom Organization -- A Comparison of Models

	Dependent Variable Authentic Student Achievement		
	Model 1	Model 2	Model 3
Intercept	.13	.31**	.22**
School			
Professional Community	.26***	.20**	.09
Elementary Level	-.63***	-.77***	-.60***
Classroom			
Social Support for Achievement	—	.19**	.04
Authentic Pedagogy	—	—	.36***
Mathematics	—	-.26**	-.15
Students			
Female	.14***	.13***	.13***
African American	-.17**	-.17**	-.17**
Hispanic	-.10*	-.09*	-.09
Socioeconomic Status	.06**	.06**	.06**
NAEP Achievement	.27***	.27***	.26***
Percentage of Between-School Variance Explained	85.0%	78.2%	99.8%
Percentage of Between-Class Variance Explained	11.4%	10.9%	65.4%

* P < .05 ** P < .01 *** P < .001

APPENDIX A

CONSTRUCTION OF VARIABLES

Construct	Components	Cronbach's Alpha
Professional Community Index		.69
(1) Shared Sense of Purpose		.74
	• Most of my colleagues share my beliefs and values about what the central mission of the school should be (TQ22B)	
	• Goals and priorities for the school are clear (TQ22C)	
	• In this school the teachers and the administration are in close agreement on school discipline policy (TQ22F)	
(2) Collaborative Activity		.68
	• How often since the beginning of the current school year did you receive useful suggestions for curriculum materials from colleagues in your department (TQ27B)	
	• How often ... did you receive useful suggestions for teaching techniques or student activities from colleagues in your department (TQ27C)	
	• There is a great deal of cooperative effort among staff members (TQ22G)	
	• I make a conscious effort to coordinate the content of my courses with other teachers (TQ22H)	
	• In a typical planning period when you meet with other teachers, about how much time is spent [on coordinating content]? Teachers decide common themes, suggest related materials and activities to guide instruction (TQ31B)	
	• Since the beginning of the current school year, about how much time per month have you spent meeting with other teachers on lesson planning, curriculum development, guidance and counseling, evaluation of programs, or other collaborative work related to instruction (TQ29)	
(3) Focus on Student Learning		.61
	• [Importance to your teaching as a goal for your students] Higher level skills (reasoning, problem-solving, critical, and creative thinking (TQ14C)	

Construct	Components	Cronbach's Alpha
	• Teachers focus on what and how well students are learning rather than how they are teaching (PROFCOM4)	
	• Teachers exhibit a reasonably focused commitment to authentic curriculum and instruction (PROFCOM5)	
	• A focused school vision for student learning is shared by most staff in the school (RSTR20)	
(4) Deprivatized Practice		.62
	• How often do two or more teaching colleagues regularly observe your students' academic performance, or review their grades or test scores (TQ18A)	
	• Except for monitoring student teachers or substitute teachers, how often have you visited another teacher's classroom to observe and discuss their teaching since the beginning of the current school year (TQ24)	
	• Since the beginning of the current school year, how often has another teacher come to your classroom to observe your teaching (exclude visits by student teachers or formal evaluations (TQ26)	
	• How often since the beginning of the current school year did you receive meaningful feedback on your performance from supervisors or peers (TQ27A)	
(5) Reflective Dialogue		.68
	• In a typical planning period when you meet with other teachers, about how much time is spent [on diagnosing individual students]? Teachers discuss problems of specific students and arrange appropriate help (TQ31D1)	
	• In a typical planning period when you meet with other teachers, About how much time is spent on [analyzing teaching]? Teachers discuss specific teaching practices of team members (TQ31C1)	
Authentic Pedagogy		.79
Classroom Instruction		.85
	• Higher Order Thinking: Instruction involves students in manipulating information and ideas by synthesizing, generalizing, explaining, hypothesizing, or arriving at conclusions that produce new meanings and understandings for them.	

Construct	Components	Cronbach's Alpha
	• Substantive Conversation: Students engage in extended conversational exchanges with the teacher and/or with their peers about subject matter in a way that builds an improved and shared understanding of ideas or topics.	
	• Deep Knowledge: Instruction addresses central ideas of a topic or discipline with enough thoroughness to explore connections and relationships and to produce relatively complex understandings.	
	• Connections to the World Beyond the Classroom: Students make connections between substantive knowledge and either public problems or personal experiences.	
Assessment Tasks		.79
	• Organization of Information: The task asks students to organize, synthesize, interpret, explain, or evaluate complex information in addressing a concept, problem, or issue.	
	• Consideration of Alternatives: The task asks students to consider alternative solutions, strategies, perspectives, or points of view as they address a concept, problem, or issue.	
	• Disciplinary Content: The task asks students to show understanding and/or use of ideas, theories, or perspectives considered central to an academic or professional discipline.	
	• Disciplinary Process: The task asks students to use methods of inquiry, research, or communication characteristic of an academic or professional discipline.	
	• Elaborated Written Communication: The task asks students to elaborate their understanding, explanations, or conclusions through extended writing.	
	• Problem Connected to the World: The task asks students to address a concept, problem, or issue that is similar to one that they have encountered or are likely to encounter in life beyond the classroom.	
	• Audience Beyond the School: The task asks students to communicate their knowledge, present a product or performance, or take some action for an audience beyond the teacher, classroom, and school building.	
Student Academic Performance		.72

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• Analysis:

Mathematical Analysis: Student performance demonstrates and explains their thinking with mathematical content by organizing, synthesizing, interpreting, hypothesizing, describing patterns, making models or simulations, constructing mathematical arguments, or inventing procedures.

Social Studies Analysis: Student performance demonstrates higher order thinking with social studies content by organizing, synthesizing, interpreting, evaluating, and hypothesizing to produce comparisons/contrasts, arguments, application of information to new contexts, and consideration of different ideas or points of view.

• Disciplinary Concepts:

Mathematics: Student performance demonstrates an understanding of important mathematical ideas that goes beyond application of algorithms by elaborating definitions, making connections to other mathematical concepts, or making connections to other disciplines.

Social Studies: Student performance demonstrates an understanding of ideas, concepts, theories, and principles from the social disciplines and civic life by using them to interpret and explain specific, concrete information or events.

• Elaborated Written Communication:

Mathematics: Student performance demonstrates a concise, logical, and well-articulated explanation or argument that justifies mathematical work.

Social Studies: Student performance demonstrates an elaborated account that is clear, coherent, and provides richness in details, qualifications and argument.

APPENDIX B

Correlations: Based on School Averages

	Authentic Achievement	Professional Community	Support for Authentic Achievement	Authentic Pedagogy
Authentic Achievement	1.0000	.3603	.2137	.6747**
Professional Community		1.0000	.7029**	.6581**
Support for Authentic Achievement			1.0000	.4954*

Correlations: Based on Classroom Averages

	Authentic Achievement	Professional Community	Support for Authentic Achievement	Authentic Pedagogy
Authentic Achievement	1.0000	.1777*	.3477**	.6022**
Professional Community		1.0000	.3477**	.3138**
Support for Authentic Achievement			1.0000	.4104**

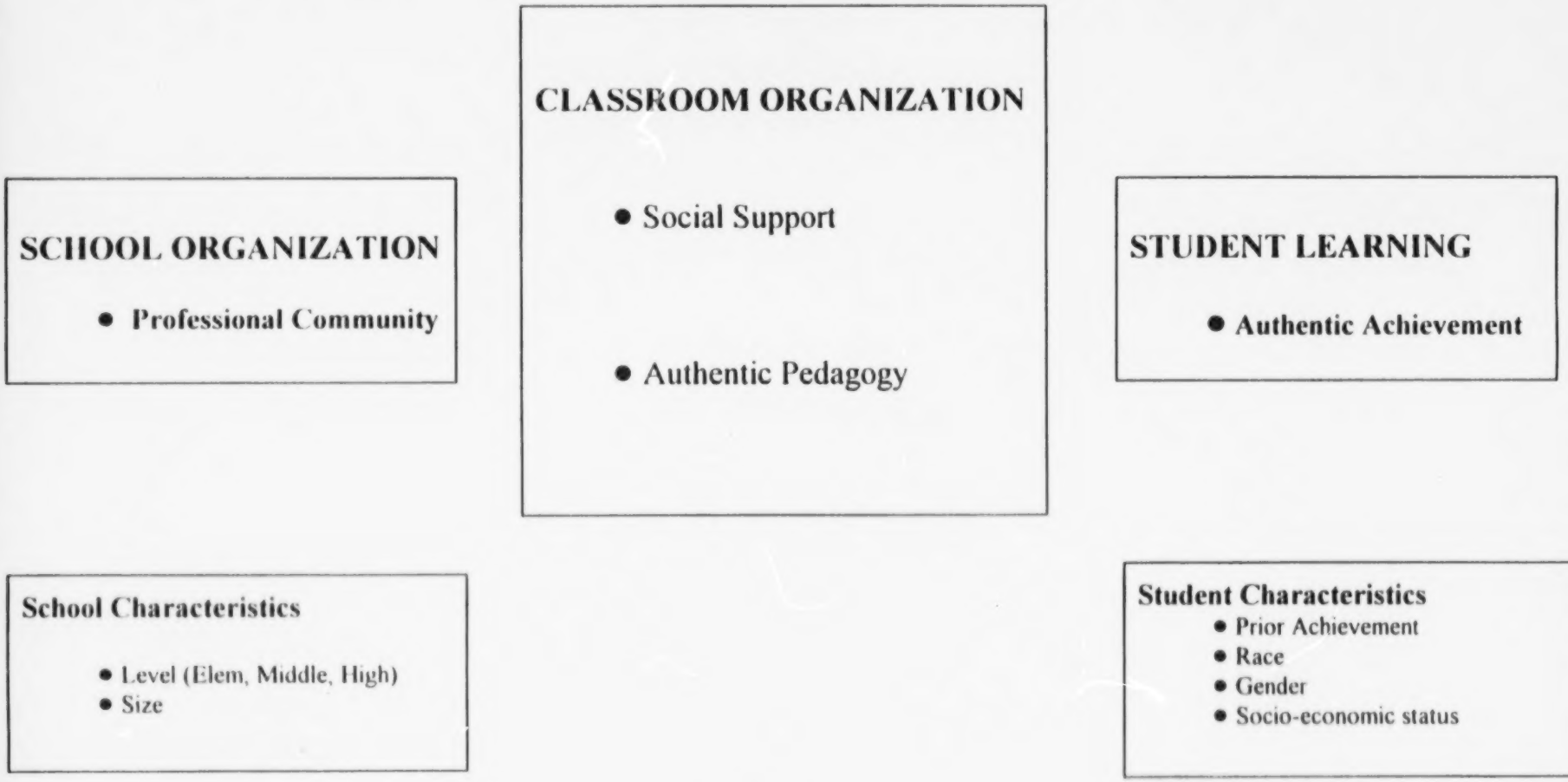
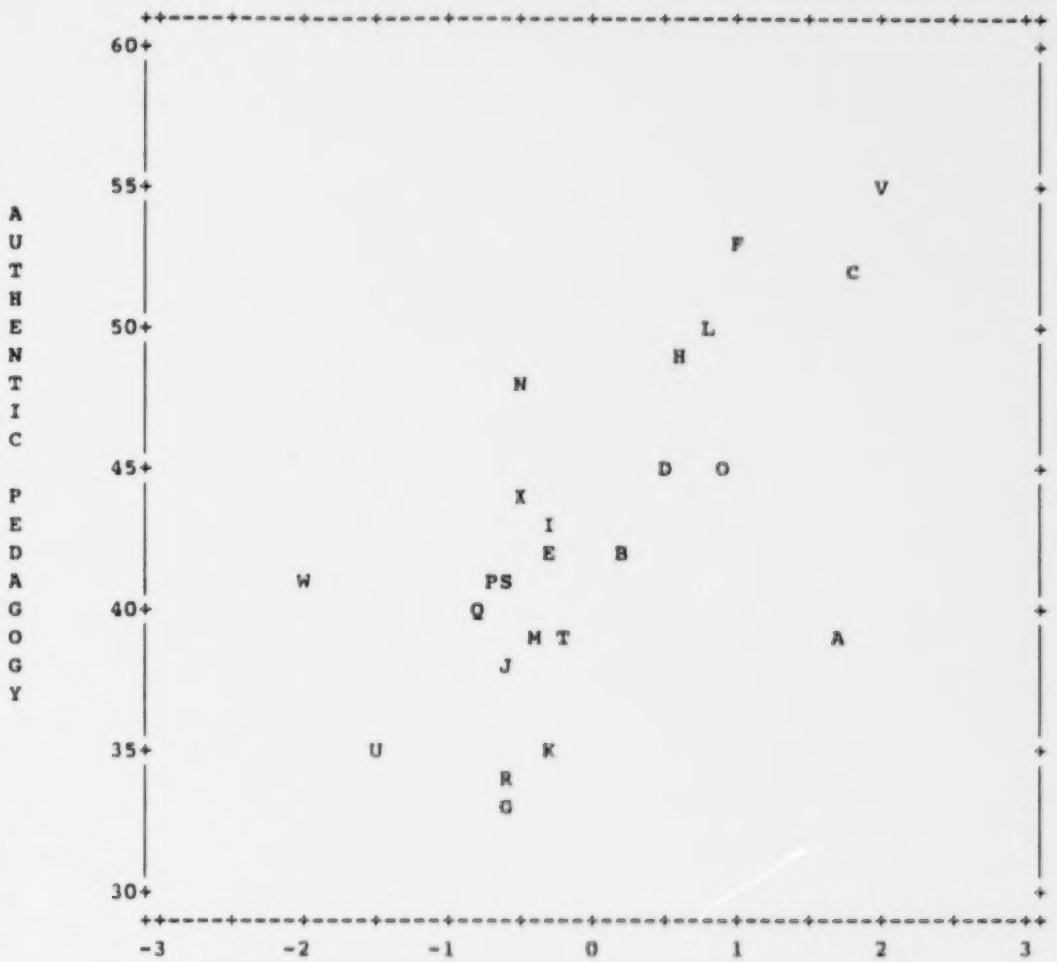


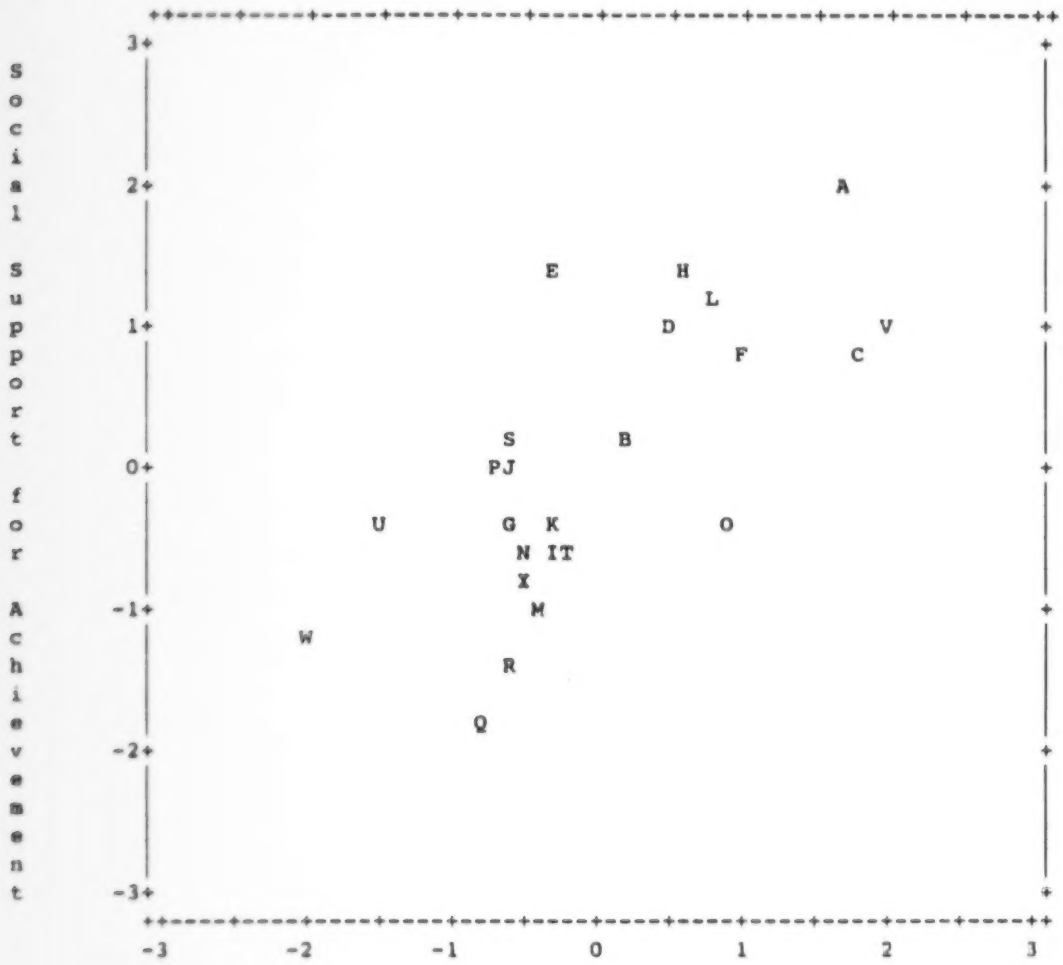
Figure 1: Analytic Framework

Figure 2
Professional Community and Authentic Pedagogy



School Key:	Elementary		Middle		High	
	A	Humboldt	I	Morris	Q	Fremont
	B	Sumpter	J	Selway	R	Wallingford
	C	Ashley	K	Baldwin	S	Flinders
	D	Eldorado	L	Red Lake	T	Huron
	E	Winema	M	Shining Rock	U	South Glen
	F	Careen	N	Copan	V	Cibola
	G	Falls River	O	Okanagon	W	Island
	H	Lamar	P	Ottawa	X	Marble Canyon

Figure 3
Professional Community and Social Support for Achievement



School Key:	Elementary		Middle		High	
	A	Humboldt	I	Morris	Q	Fremont
	B	Sumpter	J	Selway	R	Wallingford
	C	Ashley	K	Baldwin	S	Flinders
	D	Eldorado	L	Red Lake	T	Huron
	E	Winema	M	Shining Rock	U	South Glen
	F	Careen	N	Copan	V	Cibola
	G	Falls River	O	Okanagon	W	Island
	H	Lamar	P	Ottawa	X	Marble Canyon